

Biophotonics: Photonic Solutions for Better Health Care II

Jürgen Popp
Wolfgang Drexler
Valery V. Tuchin
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Editors

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Introduction

Biophotonics is a research area on the rise. Its goal is the development of new technologies and methods for medical diagnosis and therapy and for the analysis of cell processes, the understanding of which is an important prerequisite for both diagnosis, as well as therapy. Ultimately, biophotonics will not only help to increase well-being and the quality of life, but will also assist against exploding health-care costs due to our aging society.

Of utmost importance is the alignment of research and development in this field along the needs of the users, which are in many cases not, or at least not sufficient well-known. Therefore, the conference featured a special section called "Towards a Better Health Care: Unmet Medical Needs," where renowned physicians from several medical fields like pathology, oncology, and infectious diseases explained their needs to the technology- and method-developers, an event which received much attention from a large audience.

The Biophotonics conference, in the framework of Photonics Europe, was the largest of the technical conferences consisting this year of 135 presentations, including five keynote lectures, which were supported by the European Network of Excellence for Biophotonics Photonics4Life. Thomas R. Huser, from UC Davis Medical Ctr. (USA), gave a presentation on imaging of HIV transfer between T cells by employing 4D live cell fluorescence microscopy and 3D structured illumination super-resolution microscopy. Brett Bouma, from the Wellman Ctr. for Photomedicine (USA), presented results of the imaging of structure and function of vasculature with frequency domain OCT. Ilko K. Ilev, from the U.S. Food and Drug Administration, presented a variety of novel multifunctional confocal imaging and sensing approaches employed in biophotonics and nanobiophotonics. Stefan Andersson-Engels, from Lund University (Sweden), detailed recent developments in his lab employing diffuse optical spectroscopy for biomedical diagnostics and treatment control, especially with regard to controlling the treatment of prostate cancer by PDT. Finally, Lev T. Perelman, from Harvard Medical School (USA), introduced in his presentation an endoscopic instrument employing polarized light scattering spectroscopy to detect early cancer in Barrett's esophagus.

The other 130 papers touched the broad field of biophotonics including advanced microscopic and spectroscopic methods, biochips, OCT, optical tweezers and endoscopic methods, as well as PDT and dental biophotonics. By far, the most papers dealt with microscopic and spectroscopic methods followed by OCT and nano optical methods. Biophotonics also contributed substantially to the Hot Topics sessions, as two out of three opening lectures on Monday in this session featured revolutionary biomedical applications of light. These were given by the award-winning researchers Prof. Stefan Hell (Max-Planck-Institute of

Biophysical Chemistry, Germany) and Prof. Kishan Dholakia (Univ. of St. Andrews, UK).

A majority of the presenters of the Biophotonics conference submitted manuscripts which can be found on the subsequent pages. We hope that these manuscripts will inspire and stimulate the reader to make her or his own contribution to this exciting and growing field.

Jürgen Popp
Wolfgang Drexler
Valery V. Tuchin
Dennis L. Matthews